WAVES AND UNCERTAINTY

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Supplementary Material for
PHY 3305 (Modern Physics)
Harris, Ch. 4.4-4.5, 5.1-5.2

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- Review
- Plane waves as "lego mindstorms"
- single-slit diffraction and certainty
  - varying slit width, momentum, and position
- uncertainty in energy and time
  - LEP and the Z boson

REVIEW

- We moved to a wave description of nature
  - particle and wave behavior (in a measurement sense) is recovered for different "relevant dimensions"
- The wave nature is described by the Schroedinger Wave Equation (SWE)
  - Like energy conservation or F=ma, it is derived from observations of nature and cannot be constructed from "first principles"
- We discussed complex numbers and functions
- We discussed the meaning of the "wave function", $\psi(x,t)$
  - it describes PROBABILITY DENSITY (per unit length in 2-D, per unit volume in 3-D)